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1847

PRIMARY LESSONS

PHYSIOLOGY:

CHILDREN

By MRS. JAMES TAYLOR

REV.

1847

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PHYSIOLOGY

FOR

CHILDREN.

BY MRS. JANE TAYLOR.

ANNEEX

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LESSON FIRST.

The Study Explained.

What is Phys-i-ol-o-gy ?*

The word is made out of two others, and means *a talk about nature*.

What part of nature does it always talk about ?

Living nature.

Does it talk about stones, earth, and water ?

No, these have not life.

Does it then talk about plants, animals, and men ?

Yes, for these have life.

When it talks of plants what is it called ?

Vegetable physiology.

* Pronounced Phiz-e-ol-o-go.

What is it called when it talks of animals ?
Animal physiology.

When it speaks of men what is it called ?
Human physiology.

Which part is found in this book ?

The human part, that which speaks of man ?

What good will it do to know this ?

It will tell us how to keep our health,—what makes us sick,—what things injure us, and what are good for us. This study also tells us how we are made,—how we are kept alive,—and what brings death.

Do most people understand this science ?

No, they study almost every thing else but themselves.

Why have people not generally studied physiology ?

Because easy, plain books have not been written for them ?

Can it be made a pleasing study ?

Yes, one of the most so that can be put in a book.

Does this little book make it so delightful ?

You will see that it makes physiology as easy to be understood, and as interesting as a story with pictures.

LESSON SECOND.

The Human Body.

What do we find in the human body ?

Solids and fluids.

What is a solid ?

We call that a solid whose parts stick so closely together that they do not separate by their own weight. ■

Which are some of the solids of the body ?

Bones, nerves, and muscles are some of them.

Which is the hardest solid in the body ?

Bone.

Where are the bones in man ?

Under the skin, in the body.

Where are the bones of lobsters, crabs, and other shell fish ?

On the outside of the body. Shells are their bones. They protect them from injury.

Why are the bones of man not on the outside?

If bone was all over him, as it is over an oyster, he could have no feeling or knowledge.

What good do bones to man?

They make his body stronger, and keep it upright. When a carpenter builds a house, he makes and raises the frame first. Bones are the frame of the body. The skin and flesh are put on them, as the carpenter puts boards, shingles and plaster on the house frame.

What are bones made of?

They are made of our food.

What is blood made of?

The food we eat also makes blood. A part of the food makes the fluids of the body, and another part makes the solids.

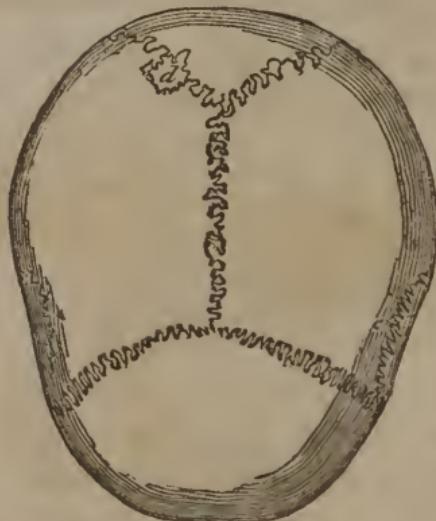
The bones of young people are very soft, easily crooked and injured. The bones of old people are dry and hard.

How do tight clothes injure the body?

They crowd the bones out of their proper shape and place.

If children are made to stand alone or walk too young, the bones in the legs are made crooked.

✗ How many pieces of bone are there in the scull ?



Scull.

Eight pieces, united like two saws when the teeth edges are put together.

How many bones are there in the face ?

Fourteen ; besides every person has thirty-two teeth. There are also four small bones in each ear, and one at the root of the tongue, making in all, 63 bones above the neck.

The tribe of Indians called the *Flat Heads*, tie the heads of their children to boards. The board pressing against the soft bones flatten the head.

What is the back-bone ?



Back-bone or Spine.

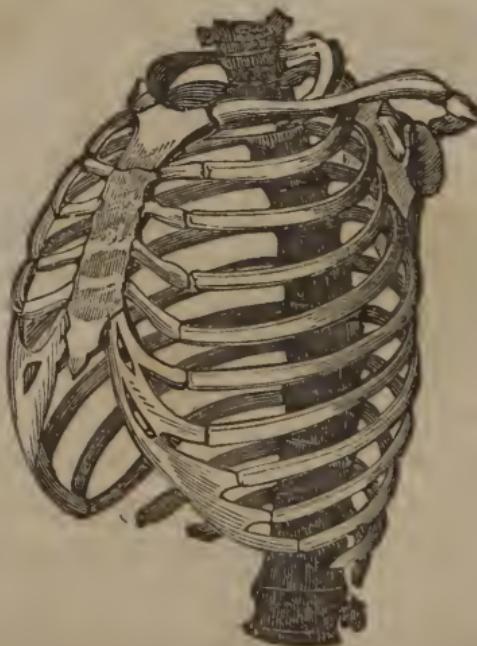
It is that which runs from the head down the back, and is made up of twenty-four round pieces, like twenty-four rings piled one above the other. These pieces are called *vertebrae*.

This *spine* or back-bone, is largest at the bottom, as this part has more weight on it.

What makes this bone crooked in some people ?

Tight lacing, sitting too much without anything to lean the back against, and want of exercise in the open air.

How many ribs has every person ?



Back-bone and Ribs.

Twenty-four, twelve on each side. They

grow out of the spine, forming a hoop, and come together in front.

What are ribs for ?



Rib.

They protect the heart, and lungs.

Where is the shoulder bone ?

Between the ribs and the neck. This bone is quite broad and flat.

How many bones are there in the arm ?

Three. One between the shoulder and elbow, and two between the elbow and the wrist.

How many bones has the wrist ?

Eight.

How many bones are in the hand and fingers ?



Hand.

Nineteen.

What is the bone called which is below the spine and above the legs.

The *pelvis*.

How many bones are there in the legs ?



Bones of the Legs and Feet.

There is in each leg, one between the hip

and the knee, and two between the knee and the ankle.

How many bones are there in each foot?



Foot.

Twenty-six.

How many bones are there in the whole body?

Two hundred and forty.

LESSON THIRD.

The Muscles of the Body.

How many muscles are there in the human body ?

It is supposed that there are not less than four hundred and fifty.

What is a *muscle* ?

A piece of flesh.

Is flesh then, muscle ?

Yes, all the lean flesh in the body is divided into parts, and each part, or number of parts, united into one, is a muscle.

Of what shape are these muscles ?

They are long, round, and fine, like bits of thread. Sometimes a muscle is made out of a number of these long, fine, strings of flesh ; as a skein of thread is made from a number of threads.

What are the muscles fastened to ?

The bones.

What is the use of muscles ?

They are the instruments by which we move the different parts of the body ; and by them we perform all motion.

How do they enable us to move ?

By being lengthened out so as to be much longer at one time, and then again by shrinking up, so as to become much shorter than the natural length—just as we can make shorter or longer a thin piece of India Rubber.

LESSON FOURTH.

The Skin.

What is the human skin ?

It is that which covers the body as the bark covers the tree.

Has a person more than one skin ?

Every person has three skins ; the under one of the three is called the real skin.

Of what is this real under skin made ?

It is made of blood vessels, and nerves, which cross each other in every direction. These blood vessels and nerves run so near each other that they appear to have been woven through in a net work.

Is this skin strong ?

It is, and can be stretched like a piece of India Rubber.

Is the skin of the same colour with every person ?

It is.

Why are negroes black, and ourselves white, if the skin is the same colour with all ?

Over the under skin of which we have been speaking, there is another one which is quite thin, and all over it is spread something which looks very much like jelly, and it is this jelly matter which gives the colour. In us, this substance which looks like jelly, is white, in the negro, it is black, and in the Indian it is copper coloured.

Has the colour of this substance ever been known to change in any one ?

It has.

A black woman was known whose face, arms, and body were nearly covered with white spots. The most of these spots were about the size of a half-dollar ; a few of them, were as large as a man's hand.

What is said of the outside skin ?

It is very thin, but not equally so over the whole body ; for on the hands, and bottoms of the feet, it is much thicker, and very hard and tough.

If a piece of this outside skin is cut, or peeled off, will it grow on again ?

Yes, in a very short time ; but if the under, *real* skin is destroyed, it does not grow again.

Does the matter which gives colour, and which we have said looks like jelly, appear again, if once lost ?

Yes, in a few hours.

Is the outside skin very firm and tight, or full of small holes ?

It is full of little holes, or *pores*, as they are called. These *pores* are so close to each other that you cannot put between them the point of the finest needle.

Why is the skin so full of little holes ?

To let useless matter in the body go out.

In what way does this matter escape ?

In the form of a very thin vapour.

What happens when these pores get filled up ?

Sores, pain, and ill health.

Why ?

Because the bad matter which ought to escape is kept in the body.

How do these pores become stopped ?

When we do not keep ourselves clean. We should wash ourselves all over every day.

Do persons usually have good health who neglect washing themselves all over daily ?

Some do—but a great number suffer from its omission.

Should cold, or warm water, be used to wash with ?

Cold water is thought the best, for persons in health, and either a coarse towel, or a flesh-brush should be used to give a healthy glow, and to keep up the proper action of the skin.

What time is considered the best for bathing.

The morning. Yet a person in good health

may take a bath at any hour, excepting, just after a hearty meal.

If we were more particular about keeping our skin in a clean and healthy state, would we suffer from colds and soar throats, as much as we now do ?

We should not.

LESSON FIFTH.

The Brain.

Has each part of the system its own work to perform.

It has. The business of the *lungs* is to draw in the air to purify the blood, the business of the stomach is to digest the food, &c.

What is the office or business of the brain?

To manifest the mind. It is the instrument by which the mind performs all its operations.

Is the brain, then, the mind?

No. The *eye* is not *sight*, because it is used in seeing, nor is the *ear*, *hearing*, but the organ of hearing. So the brain is not the mind, but the organ, or instrument of the mind.

What is the brain made of?

Flesh and blood, and will decay.

What is mind?

It is not matter, but a spirit, and will live for ever.

How many things are necessary in order to see an object ?

Five things. An object, light, an eye, a nerve running from the eye to the brain, and the brain.

Suppose there is an object, light, an eye, and a nerve, and *no brain*, can any thing be seen ?

No. The brain is the seat of all feeling and knowledge. In this world the mind acquires knowledge in connexion with the brain.

Has the brain any other office than to aid the mind ?

Not that we know of.

LESSON SIXTH.

The Nervous System.

Where is the brain ?

It lies in the top of the head.

What is the brain made of ?

Soft flesh, filled with blood, the whole having a greyish colour.

How large is it in a grown person ?

It will weigh from three to four pounds, and will fill the two hands of a large man, it is about six inches long, five inches wide, and four inches thick.

Have we but one brain ?

Every person has two brains, as all have two eyes, and two ears. One brain lies on each side of the head.

Is there any feeling in the brain ?

No, it may be cut in pieces with a knife, and the person does not feel it.

Does all of the substance called the brain lie in the head?

No, small parts of the brain run off in every direction through the body.

What are these pieces of the brain which run through the body called?

They are called, nerves.

What then is the nervous system?

The nervous system are those parts of the brain which are in small strings extended through the whole body.

Is every nerve connected with the brain?

It is, for the nerve is but a part of the brain.

Where do we find the nerves?

In the ends of the fingers, in the toes, and in every part of the system.

Which is the largest nerve in the body?

The spinal marrow.

Where does this lie?

Through the centre of the spine, or back

bone. Running from the middle of the brain between the ears and down through the neck.

Does this large nerve send out small ones through the body ?

It does, in great numbers. Small parts of the brain also go to the ears, eyes, nose, tongue, &c.

Of what use are the nerves ?

Without nerves, we should have no feeling. They give us feeling. And if there was no nerve going to the eye we could not see, neither could we smell, or taste, if there were no nerve running to the nose or the tongue.

If I run a pin into the skin, why do I feel pain ?

Because the pin pierces a nerve. If an animal had no nerves you might pound it in a mortar and it would feel no pain.

Are there any animals without nerves ?

Some of the insects are destitute of nerves, and are supposed not to feel pain when eaten by larger animals.

Have nerves any other use than to give us feeling?

They cause the muscles to move. Thus, a man wishes to raise his arm. The nerve carries the wish of the mind to the muscle. Without nerves we should have no command over the muscles, and could not move.

LESSON SEVENTH.

The Sense of Touch.

If I press my finger against the point of a pin, what do I feel?

Pain.

Very true; most people would have said they felt the pin. Pain is felt, but not the pin. The prick, or pain, tells us that the pin is there.

What is the cause of this *feeling*, or as it is sometimes called, *sensation*?

The pin touched a nerve, and the nerve carried the impression made by the pin, to the *brain*.

When any thing touches the body, what is produced?

An outward, or external sensation.

Are there any inward, or internal feelings?

Hunger and thirst are internal sensations.

How many kinds of feelings, then, have we ?

Two. External sensations, caused by something touching the body, and internal feelings, caused by hunger, thirst, &c.

If we could neither see, touch, taste, hear, nor smell, would we know any thing ?

Not much, and though the *mind*, given to us, at first, by the Creator, would remain very ignorant, in this world, yet it would still remain within us, and *live for ever*.

What is the duty and work of the senses ?

To carry knowledge to the mind.

How does *feeling*, or the sense of touch, carry information to the mind ?

The sense of touch, like all the five senses, is on the outside of the body, and gives warning to the mind when any thing comes against it.

How do we know that any thing is rough or smooth, cold or hot, sharp or blunt ?

By the sense of touch.

Can we tell how hot any thing is by the sense of touch?

Not exactly; for a piece of iron will *feel* colder than a piece of woollen cloth, though both the iron and cloth have the same amount of heat in them.

How is this? Why does the iron feel colder?

The hand has more heat in it than either the iron or cloth. The iron takes out the heat from the hand much faster than the cloth, and thus makes the hand feel cold sooner.

Why does heat go into iron quicker than into cloth?

Because the iron is a better *conductor* of heat. The sense of touch, then, does not tell us exactly the amount of heat in objects.

Can we abuse and blunt the sense of touch?

To a great degree. Mr. Chabert could wash his hands in melted lead, and drink boiling oil, without any appearance of injury.

Is there a difference with people in this ?

Some are very *sensitive*, that is, have very keen, nice feelings ; others seem to have but little more feeling than an oyster.

Where is the sense of touch the keenest ?

In the ends of the fingers.

How do the blind read ?

By passing the ends of the fingers over letters, raised a little from the page for their use.

What has M. Buffon said ?

It was his opinion that the cause why one person knew more than another, was, he had made a better use of his hands. The hand is a great source of knowledge, and this source is not given to animals.

Mr. Mudie says there is a mine of wealth in the ends of the fingers.

May the sense of touch be greatly improved ?

Yes ; the blind, who have to *see* with their fingers, can tell whether a thing is black, red, white or blue, by the sense of touch.

What has the sense of touch very perfect besides a man's fingers?

The end of an elephant's trunk. This is almost as accurate a feeler as a finger.

LESSON EIGHTH.

Sense of Taste.

In which part of the mouth does the sense of taste mostly lie?

On the top of the tongue.

If we had no tongue, would all our food taste alike?

Nearly so.

I thought the only use of the tongue was to talk, but I see that it gives the delightful pleasures I have in eating.

You could not swallow without a tongue.

What is the tongue covered with?

The ends of a great number of little nerves rise up above the skin on the tongue. These numerous, small soft points, are called *papillæ*. They give to the top of the tongue a soft, velvet appearance.

Has the tongue any thing on it ?

When a person is in health, a thin fluid, looking like water, is spread over the papillæ, or the raised ends of the little nerves.

What takes place in sickness ?

The tongue and mouth are then dry and hard, the thin fluid we just mentioned, is not there to moisten the parts.

Why have we but little or no taste, when sick.

Because the tongue is dry, and covered with a coat of scaly, furry matter.

Does this scaly, furry coat cover up the ends of the nerves ?

It does.

What gives us the sense of taste, then ?

The papillæ on the tongue.

Does gratifying this sense improve the mind, like listening to music, or looking at paintings ?

No ; the enjoyments from the sense of taste are low, and may almost be called beastly, or sensual.

Does great attention to what we eat and drink make us neglect the mind ?

It does.

Can we almost destroy the sense of taste ?

We can ; by eating chalk, tobacco, pencils, pickles, &c.

What do the *Siamese* eat ?

They have so much abused the sense of taste that they consider rotten eggs, and putrid meat, the best dishes they have.

By what do a great many almost destroy the sense of taste ?

By chewing tobacco.

How does tobacco injure the taste ?

The juice and small parts of the poisonous weed cover over the papillæ on the tongue.

Do animals have this sense ?

Yes ; and some of them as keenly, or more so, than we find it in man. They tell what plants are poisonous by the sense of taste.—

Animals will not eat tobacco.

What else impairs this sense, and frequently almost destroys it.

Drinking ardent spirits. They burn the ends of the nerves to a hard crust.

How can we preserve this sense ?

By eating plain, nutritious food, and such as is agreeable to us *at first*.

LESSON NINTH.

Smelling.

In what part of the nose is the sense of smell ?

In the inside of the two holes called nostrils.

What is this surface always lined with ?

A thin sticky matter, called *mucus*.

If this thin matter is not supplied, is there any smell ?

There is not.

In what animals are these two holes of the nose very large ?

In those which can smell the best.

What destroys this mucus and injures this sense of smell ?

Taking snuff.

Do snuff takers sometimes *entirely* lose this sense ?

They do.

What other bad effect has snuff ?

It injures the voice.

Are the nostrils kept moist in any other way ?

By tears which pass down from the eyes to the nose.

If we hold a rose to the face and breathe through the mouth will any odour be perceived ?

No, the mouth cannot smell any more than the eyes can hear.

What is *odour* ?

Fine particles of matter which rise off from things as vapour rises from the water.

Can we see this odour ?

No, it is too thin, and airy.

Have animals a stronger sense of smell than men ?

Many have, particularly those which feed on putrid flesh.

How far is it said that vultures can smell ?

Many miles.

LESSON TENTH.

Hearing.

What makes a sound ?

If I strike a bell with a hammer, you can see a *trembling* motion in the bell, for a short time. These tremulous motions are called *vibrations*.

What have vibrations to do with sound ?

The quivering trembling bell, gives numerous, sudden strokes to the air which is thus put in motion.

What kind of motion is given to the air ?

If I drop a stone into a still pool of water, the little waves one after the other, run out in every direction.

Yes, I have seen this.

In the same way when the bell quivers, numerous slight *waves* are made in the air. These waves are called vibrations of the air.

Where do the vibrations go ?

They strike against the *drum* of the ear and give us the sense called sound.

How are these motions, or vibrations, given to the air when I blow through a flute or horn ?

The air blown into the instrument, goes out *with force* and makes motions or waves in the air of the room, and these waves strike against the ear.

What is the *drum* of the ear ?

That which we call the ear and is placed on the *outside* of the head, catches, or gathers in these airy waves and conducts them into the head a short distance to the drum. This drum fills up the hole of the ear, by crossing it, as a drum head, crosses the drum.

Do the waves of the air strike against this ?

They do.

What is this *ear-drum* made of ?

It is a thin film, or skin, closing up the ear about an inch from the outside.

What is in the hole of the ear between this

partition or ear-drum, and the outside of the head ?

Ear-wax.

What is the use of this ?

It keeps the ear moist.

Can insects crawl into the head ?

No. They can go no further than the drum. Though when they touch this, great pain is given.

What goes into the head from the inside of this drum ?

A nerve leading to the brain.

Can any thing else convey sound but air ?

Water is a better conductor of sound than air. That is, a man can hear farther through water, than he can through air.

Is wood a good conductor of sound ?

It is.

How fast does sound travel through the air ?

Eleven hundred feet in a second. In water the speed is four times as great.

Can hearing be much improved by cultivation?

Like all the other senses, it can.

How wisely the air is made! It tells us that a wagon is coming, that we may get out of the way.

A man sees a house on fire, and he runs to strike the bell. The little airy waves, like messengers, run to every person in the city, to tell him of the danger.

We could not live if it was not for air; wood and candles would not burn if there was no air, and we could not hear each other talk without it. And air gives us all our sweet music too.

LESSON ELEVENTH.

Seeing.

What is necessary to the senses of touching, tasting, and smelling ?

The object must be present, so as to meet the skin, mouth, or nostrils.

How does seeing, or the sense of sight differ from these three senses ?

The object can be perceived at a distance, it need not come and touch the eye to be seen.

Is the eye then a much higher, and more perfect sense ?

It is.

How is the eye made ?

Very ingeniously, for it is the most perfect instrument we know of.

What instrument has man made that resembles the eye ?

The *telescope*.

What is this telescope for ?

To aid the eye in seeing distant objects.

It is a long tube like a gun-barrel having glasses placed across all along the inside.

What taught man to make such an instrument ?

The form, and make of the eye.

Will you tell me the structure of the eye ?

It has three coats around it, the same as if you should put three covers round a ball. It has also a little thin fluid between each coat.

What is that little round thing in the centre of the eye called ?

The *pupil*.

What is the colour of the outside covering of the eye ?

White, and is what we call the *white* of the eye. It is hard, and to it are fastened the muscles which move the eye.

What is spread over the middle covering of the eye ?

A very dark paint.

What is the colour of this paint in those singular eyes called, *red eyes* ?

Light coloured.

What is the third, or under covering of the eye ?

It is nothing but the flattening out of the end of the nerve which runs from the eye to the brain.

What is the use of these coats, and the fluids between them ?

To receive, and arrange rightly the rays of light.

Is a likeness of every thing we see painted for the time on the inner coat ?

Yes, so wise men say.

How can you see this ?

If you look into another persons eye you see yourself, just like looking into a glass.

When is a person *squint-eyed* ?

When one eye looks at an object, and the other at something else.

Does such a person see anything with more than one eye ?

He does not.

What is the best way to cure a squint ?

Blindfold the well eye, and cause the person to see entirely with the unruly one. This crooked one is generally weak, a person being obliged to exercise it strengthens it.

When the eye is too round, what is the effect ?

The person is *short-sighted*.

Can fishes see far ?

No, for their eyes are as round as a bullet.

Does the eye flatten as it grows older ?

Yes, and people short-sighted when young, can see at a great distance when old.

What makes a person *long-sighted* ?

Great *flatness* of the eye.

Why do old people hold the book a great ways from them when they read ?

Because as we said, the eye grows flatter as it grows older.

Who educate their eyes to see at a great distance ?

Sailors, by constantly looking for objects at a distance.

Who make themselves *short-sighted* ?

Watchmakers, and *engravers*, by always looking at things close to the eye.

Have persons been known who could not distinguish one colour from another ?

There have been.

Have all insects eyes ?

Some have none, others have a great many.

How many eyes has the ant ?

Fifty.

How many eyes has the beetle ?

Three thousand.

How many has the silk-worm moth ?

Six thousand.

How many has the dragon fly ?

Twelve thousand.

Has any insect more eyes than this ? .

Yes, some are known that have twenty thousand.

What! is every one of these a *real* eye, and a good one?

Yes, every one is a separate, good seeing eye.

What do they have so many eyes for?

Well, it is necessary for them to have twenty thousand to see with.

Why do you have two eyes?

To see with.

What good does the *eye-lid* do?

It moistens the eye, preventing it from becoming dry, and washes off every time you wink all the little dust which may settle on the eye.

How wise and good must the Creator be who made the eye, so perfect, so wonderful, so beautiful.

We should never abuse this nicely made, and delicate instrument by straining it too long at one thing, or by reading when there is not a good light.

LESSON TWELFTH.

Circulation of the Blood.

Is the blood always rapidly moving through the body ?

It is, if the blood should stop moving, we would faint away instantly.

What makes the blood keep constantly going round and round through the body ?

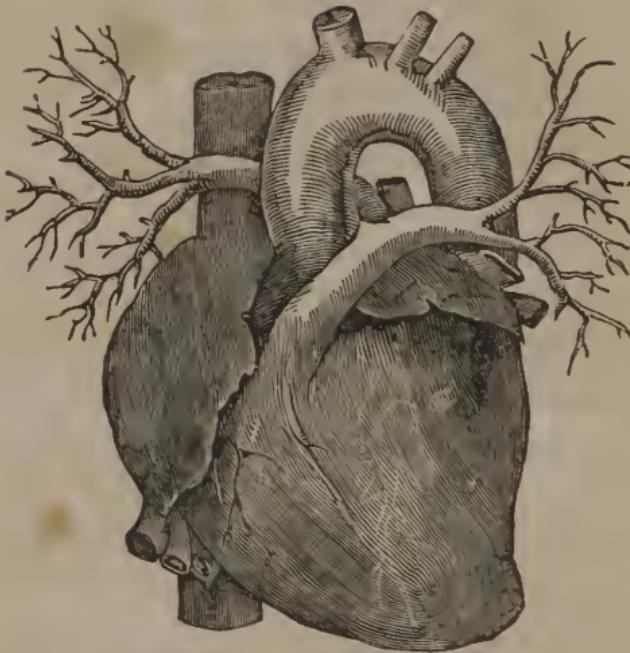
The action of the heart.

Where can you feel this action ?

By putting the hand on the left breast, and by the strokes of what is called the *pulse* in the wrist.

What takes the blood out from the heart through the system.

The *arteries*. These are small pipes, running into every part of the body.



The Heart.

What brings back the blood again into the heart?

The veins.

What colour is the blood, when it comes back through the veins?

Black and thick, having picked up, and now carrying with it the impurities of the body.

What does it go back to the heart for ?

To be sent into the lungs, to be purified.

How often does *all* the blood go out from the heart into the system and then back again into the heart ?

Once every *three minutes*.

Why ! how rapidly the blood circulates in us !!

How much blood has a man ?

From thirty to forty pounds, or from four to five gallons.

What we call the beating of the heart is its motion to throw out the blood. Two ounces of blood are thrown out every beat.

What is said of the rapid circulation of the blood ?

The faster it circulates, beyond what is natural the sooner will the body wear out.

How often does the heart strike in a minute, with a temperate man.

Seventy times.

What effect has drinking ardent spirits ?

It makes the heart strike faster.

Does it not follow from this that ardent spirits must shorten life ?

It certainly does. Drinking throws the system into an *excited, destructive* state.

How often does the heart beat every day ?

More than one hundred thousand times.

Does it not get tired ?

No. Man is "wonderfully and fearfully made."

LESSON THIRTEENTH.

Breathing.

Why does breathing keep us alive ?

By breathing we draw in the air which purifies the blood, and prepares it for nourishing and supplying the body.

Where does the air go to when we breathe it in ?

Into the lungs, where it meets with impure blood. The air purifies this blood, which immediately after runs away into the body to nourish it.

What throws the blood into the lungs ?

Small vessels are all the while pouring bad blood into the lungs, and taking it out after it is made good.

How often does *all* the blood in the body pass through the lungs ?

Twenty times an hour.

What makes the blood bad ?

As it passes through the body it gathers up impure particles in the system, and in this way becomes bad. It now has to go to the lungs to be purified, and to be made fit to go out again into the system to do its good work.

What is it that purifies the blood ?

Air.

How does air get to the blood ?

By breathing.

What are the lungs ?

They are pieces of soft flesh filled with holes or cells, and look like a sponge.

How many lungs are there ?

Two. One lying on each side of the heart.
When we take in air, they fill and swell out.

Does all the air we breathe in, act in purifying the blood ?

Only that part of it called *oxygen*.

Why should school-rooms have plenty of fresh air let into them ?

The oxygen of the air in the room is soon used up by the breathing of the children, and air should be let in to supply more oxygen.

What else should be done ?

After the air has been breathed it is unfit to improve the blood, and it should be permitted to escape out of the room, through holes made in the ceiling.

LESSON FOURTEENTH.

Heat of the Body.

If we heat a piece of wood, iron, or stone, and draw it from the fire it soon grows cold.

We find the body warm, but why does it not grow cold like a piece of iron we have heated?

There are two things which keep the body warm,—breathing, and the circulation of the fluids.

What is the natural heat of the body?

Ninety-eight degrees.

How warm is a room in winter when comfortable to sit in?

Sixty-five or seventy degrees.

How warm in the shade is it, the hottest days in summer?

About ninety or ninety-two degrees.

The body by this, then, is warmer than a hot day or warm room.

Well, if there is no little stove in the body, or sun, to keep it warm, what is it that gives it heat?

The heat of the body is produced, as we have said, by breathing, and the circulation of the fluids.

In what way does breathing heat the body?

The part of the air called *oxygen*, unites with the blood, and this mingling produces heat.

If I rub two pieces of anything against each other, they soon become warm.

So, when the blood and other fluids of the body circulate through the system, the friction causes heat.

Which has the most heat in the body, a young person, or an old person?

A young person.

Why ?

Because the circulation of the fluids in a young person is more rapid.

Why does a person become almost cold just before death ?

The circulation of the blood and breathing at that time have almost ceased.

LESSON FIFTEENTH.

Food.

What makes blood ?

It is made from the food we eat and drink.

How is our food changed into blood ?

The food, while in the stomach, first becomes *chyme*, this is changed into *chyle*, and a part of the *chyle* turns red, and we call it blood.

What is *chyme* ?

The food we take, moistened, ground, and mixed finely in the stomach ; it has a grayish colour. A few juices, called bile, &c., are poured on the *chyme*, which is turned into *chyle*. *Chyle* is thin, and white, like milk.

What turns *chyle* into blood ?

No one has yet found out ; neither do we know at what time it turns red.

What is digestion ?

It is the food undergoing the change we have spoken of, in the stomach.

Do not some things digest quicker and easier than others ?

What is called *light* food, such as milk, bread, &c., digests, that is, goes into chyle, sooner than heavy, hearty food.

What helps digestion ?

Care in not over eating, cleanliness of the body, exercise at least four hours a day in the open air, and a quiet position immediately after eating.

What is the most healthy food ?

That which we find, by experience and observation, to be the most agreeable. Most people are the healthier for a little meat every day. Eating too much makes us sick; it is not the *kind* of food that we need care so much about.

LESSON SIXTEENTH.

The Teeth.

Are teeth, like all other bones, made from our food ?

They are, and like other bones, consist chiefly of lime.

In what do they differ from other bones of the human frame ?

They are entirely covered with a smooth, hard substance, which is called *enamel*.

What good does this enamel do ?

It not only makes the teeth handsome, but prevents their being easily broken.

How many parts are there to a tooth ?

Two ; called the *crown* and the root. The crown is that part which we see, and the root

is the part which lies in the gum, and is fastened to the jaw-bone.



Under Jaw, and Teeth.

How many teeth has a young child?

Twenty; ten in the upper and ten in the lower jaw. When the child gets to be six or seven years old, these teeth all drop out, and new ones come in their places.

How many teeth has a grown person when the set is perfect?

Thirty-two; sixteen in each jaw.

How many kinds of teeth are there?

Three ; the *front* teeth, *eye* teeth, and *grinders*.

How many are there of each kind ?

In each jaw there are *four* front teeth, *two* eye teeth—one each side of the front teeth, and *ten* grinders, five on each side.

Are the teeth supplied, like other bones, with blood vessels and nerves ?

They are.

What is it that gives us the pain which we call *toothache* ?

When a tooth is decayed, the nerve of it is exposed to the air, and when we eat, some of our food is pressed against the nerve, and this causes the pain.

What are some of the uses of the teeth ?

They help to prepare nourishment for the body, by grinding the food very fine. This makes it easy to digest.

If we had no teeth, would we have those pleasures in eating, which we now enjoy ?

We would not ; for the only food which we

could then take, would be spoon victuals, such as young children feed upon.

Are the teeth useful in any other way ?

Yes; they assist the voice in talking, reading, and singing. If a person loses two or three front teeth, he talks, reads, and sings in a hissing manner, which is called *lisping*. The loss of teeth, also prevents a person from giving the correct sounds to many letters.

We see that teeth are of great use to us, ought we not then do every thing in our power to keep them ?

Yes; we ought never to pick them with pins, needles, or penknives. These break the covering of enamel, and when this is broken, the teeth soon decay.

Is there nothing else which injures the teeth but picking them with hard substances.

Taking food into our mouths which is either very hot or very cold, also destroys the teeth.

Why are the teeth of the people who live in

Europe, especially the Irish, so much better than our own ?

The chief reason is, that their food is more simple.

Is it possible for us to preserve our teeth many years, without we keep them quite clean ?

No ; every person should cleanse his teeth with a brush and water, after every meal, and especially before he retires to rest. Some good tooth powder may be used twice a week.

When a tooth is so much decayed that it cannot be filled, what should be done ?

It should immediately be taken out, and the nerve destroyed.

Why ?

It not only taints the breath, and makes it disagreeable, but injures the other teeth, by keeping the mouth in a sickly state.

If a person wishes, then, to have a sweet breath, of what must he be careful ?

Of his teeth.

How do a great many give themselves a bad breath?

By drinking ardent spirits, smoking, and chewing tobacco.

LESSON SEVENTEENTH.

The Voice.

In what part of the throat is the voice made?

The upper part.

How is sound in the throat made?

By muscles, fourteen in number.

How many different tones of voice can a person make?

At least fourteen, and by practice perhaps several more.

Which is the most perfect musical instrument we know of?

The human throat.

Are people generally good players on this instrument?

No, only a few cultivate the voice, the most

using, during the whole of life but one or two tones.

Are not a variety of tones in speaking or reading, as pleasing to the ear as a variety of sounds in music ?

Yes, and it is the duty of all to obtain more power over the voice, by practising reading, and speaking on different tones, and by singing.

How often should we sing ?

At least one hour every day.

Should singing be taught in every school ?

Yes, all the schools in Germany teach singing.

What has been the effect of this ?

The Germans are more cheerful, and healthier than we are.

The disease called consumption is seldom known in Germany, and it is believed that singing is the main reason.

What influence has singing on the character ?

A happy one, for we can *sing* some good things into men, that we cannot *talk* into them.

What do the Germans say about music ?

Their proverbs are these ; “Where singing is not, the devil enters,” and, “singing is the gymnastic of the affections.”

LESSON EIGHTEENTH

The Hair and Nails.

Of what use is hair to us ?

It serves as a covering to the head. A fine head of hair is also considered a great ornament.

Has each hair a separate root ?

Yes, every hair has a separate root under the true skin, from which it draws nourishment.

Is the hair supplied with nerves, and blood vessels ?

It is not, yet each hair has two parts, the outer covering, and the inside pulpy substance.

What is thought to give colour to the hair, to make some light and some dark ?

The pulpy matter in the centre of the hair, is supposed to contain the colour, just as the

pulpy substance under the skin, gives to it, its colour.

What makes the hair sometimes get grey, and fall out ?

When the bulb at the root ceases to give nourishment. Also, when the hair is not kept clean, it grows sickly and falls out.

Are people generally, as careful of their hair as they should be ?

They are not, and it is owing to this neglect that some persons are troubled with very uncomfortable diseases.

Should the hair be often washed ?

At least once a week, with lukewarm water and a little soap. This should be done at night just before retiring, as the person will not be so liable to take cold.

What use are our nails to us ?

They appear to give strength, and support to the fleshy part of the fingers.

Of what are nails composed ?

Chiefly of *albumen*.

What is *albumen* ?

The word means *white*, and denotes a fine, thin whitish matter, found in the blood, chyle, &c.

Does this collect and form the nails ?

It does.

Are not the nails very often neglected ?

They are, and thus become black, out of shape, and unseemly.

What should we do to them ?

Keep them cut moderately short, though not too close, and by all means keep them clean under the ends.

Do not even some mannerly people go from day to day with dirty nails ?

We frequently see this and it shows a careless unclean mind.

LESSON NINETEENTH.

Clothing.

What next to keeping the skin clean, is essential to health?

Clean and proper clothing.

Is it right to wear thin airy clothing in winter?

It is not right, as it exposes the person to all the sudden changes of temperature, and makes us liable to have coughs and other diseases.

Is too much clothing as injurious as too little?

Yes. A person should wear just as much clothing in kind, and quantity as will protect him from the sensation of cold.

Must we seek warmth in clothing only?

No, we must get it by taking moderate exercise every day, in the open air.

If we neglect this the body becomes weakened and relaxed.

Should dress be worn tight about the body ?

No. It is very hurtful, and should never be worn so as to press against any part of the chest. It is known that many die every year of consumption, the foundation of which is laid by tight lacing.



Natural Form.



Fashionable Form.



No. 1.

No. 2.

No. 1. Shows the ribs of the "Natural Form."

No. 2. Shows the ribs of the "Fashionable Form" as they are squeezed in by lacing.

Is the wearing of flannel next to the skin, thought good for the health?

Yes, as it protects the body in a great measure from the injurious affects of sudden changes in the atmosphere. Flannel is a bad conductor of heat, and prevents the warmth of the body from escaping.

In what season of the year should flannel be put on?

Many persons wear it the year round, but it

is much better to put it on at the beginning of fall, when the changes from heat to cold are so sudden, and to leave it off during the summer months.

Should flannel be often changed ?

It should, for it soon becomes filled with the vapour which is constantly going out from the body. It would be well to have two sets of flannels, one for the day, and the other for night, and have them well aired by turns.

Should night dresses, for the same reason be well aired ?

They should. Instead of folding them up, and tucking them under the pillow, as is the common practice, they should be hung on a nail where they will be exposed to the air all day.

Do not beds, as well as clothes, become filled with this vapour which is constantly issuing from the body ?

Yes, and for this reason, the clothes should

be taken off, the bed shaken up, and the window left open for several hours in the day.

This makes every thing fresh, and sweet.

When this is not attended to, what is the consequence ?

The air becomes impure, and fevers and bad health appear.

LESSON TWENTIETH.

Exercise.

Can a person have good health without taking exercise ?

Not for any length of time.

Where, when, and how must exercise be taken, to do the most good ?

In the open air, and from two to three hours after breakfast. Exercise should not be taken just before, nor immediately after, a meal, unless it be very moderate.

Why is exercise injurious just before eating ?

If exercise be put off until the body is a little weakened from the want of food, it lessens

the strength which is left, and hurts digestion.

Why must it be avoided just after a meal ?

Because the digestive organs are more active at that time than at any other, and if exercise be taken, it draws the strength of the blood and nervous influence away from the stomach and almost stops digestion.

If we are compelled to take exercise soon after eating, should the meal be moderate ?

It should.

Do not many persons, in order to save time, put off walking until just before night ?

They do ; but it is not a good plan. The air towards night is damper and not so healthy as at any other time of the day.

What kind of exercise is the best ?

Such as will interest the mind as well as the body. Ball, battle-door, hide and seek, beating the hoop, are all healthy amusements, and serve to strengthen the body.

LESSON TWENTY-FIRST.

Health, &c.

Does *thinking*, or an active mind, improve the health of the body ?

It does, for any mental effort exercises the *brain*. The brain we have seen, runs, by means of the parts called *nerves*, through every part of the body. The soundness and health of the body depends very much on the sound, healthy state of the brain and nerves.

Does exercise strengthen and invigorate any organ of the body, or faculty of the mind ?

Always, if the exercise is not too great or violent.

I perceive, then, that thinking strengthens the nervous system, and in this way must improve and promote health.

But do not slaves, and other very ignorant people, have good health ?

Frequently, but when disease falls upon them they have no mental energies to overcome it ; and the ignorant sick man, lies down in despair and weakness at once.

The mind, *if strong and educated*, has a great control over the pains and diseases of the body.

I did not know before, that studying improved the body as well as the mind.

It must be so, for man has a mind to be exercised and kept healthy, as well as a body. If a man were to sit still in a chair for one year, he would lose all the health and strength of his body. So, if he neglects the vigorous exercise of his mind, for only a short time, it loses all its powers.

I can see the reason of so many *mental dwarfs*. They have neglected reading, and thinking, and are filled with superstitious notions, which cramp and *belittle* the soul.

What has a great man said ?
“Reading makes a *thinking* man, and a
thinking man, will be a great man.”

LESSON TWENTY-SECOND.

Effects of Ardent Spirits on the Body.

How does drinking ardent spirits affect the stomach ?

It deranges the stomach, and changes its natural form.

How is this seen ?

If, we examine the stomach of a person after death who has been in the habit of drinking, we shall see the inside of the stomach feverish, and inflamed, and all the little vessels filled with sickly, black blood.

Do ardent spirits burn the stomach, as they do the mouth and throat ?

Certainly, only much worse, as the hot fiery stuff *is kept in the stomach*, but soon leaves the mouth and throat. If the *burning* drinks, should stop as long in the mouth and throat, as

84 EFFECTS OF ARDENT SPIRITS ON THE BODY.

they do in the stomach, the whole mouth would be in a blister.

Do they blister and make a hard crust around the stomach ?

Always. The stomach of a drunkard is lined inside, with a *hard* crusty wall, which greatly prevents digestion and brings disease.

When the stomach is diseased, are other parts of the body affected ?

Yes, the head aches, the lungs and liver are disordered, and all the body must be more or less injured.

What effect has drinking on the *liver* ?

It enlarges the liver. In some places the liver of fowls is considered a great delicacy. Here the poultry-raisers, feed fowls on rum, (mixed with meal,) to enlarge the liver. The liver of the drinking man, soon becomes of a frightful, unnatural size.

What is the natural colour of the fluid in the liver.

Bright yellow, but drinking changes it to a black, thick substance, like *tar*.

How does drinking effect the brain ?

It hardens it and shrinks up the arteries.

Is the heart injured by ardent spirits ?

Drinking excites the heart to a very hurried, unnatural motion. This hastens on the natural wear of the system.

Is the blood injured by drinking ?

Yes, it may be nearly destroyed, for ardent spirits deprive it of its bright red colour, and thus take out its living principle. The blood of a drinker is much blacker, than the blood of a temperate person.

Is there any nourishment in alcohol, or ardent spirits ?

No. Alcohol is not digested in the stomach ; none of it makes *chyle*. But alcohol, burning as it was taken into the mouth, is found in the blood, and in the brain, and in other parts of the system.

LESSON TWENTY-THIRD.

Man.

In what does man differ from every other animal ?

He stands upright, and has hands.

Is there no other animal which has hands ?

There is not ; though the front feet of the Monkey are something like hands.

Can you think of nothing else in which man differs from every other animal ?

His *brain is larger* than that of any animal of his size. He has articulate language, reason, and knows what is true and what is false, what is right and what is wrong. Man is, also a being, *made to be educated*.

Are not animals made to be educated likewise ?

No. Their nature, *or instinct*, is as know-

ing *at first*, while they are young, as in after years, when they are old.

Man is made to be educated, and beasts are made for his use and happiness.

Has man *all* the senses more perfect than any animal?

He has, though a few animals, have some of the senses more perfect than man.

Thus, the eagle can *see* farther, the dog can smell better, and some of the insects, with their nice feelers, can feel more nicely.

What has Buffon said?

He remarks in his Book on Animals, that man has but one faculty that is not found in some animal.

What faculty is that?

The moral or religious faculty. The faculty which tells man that he ought to *do right*, and that gives him pain if he does not do right. The faculty that tells us we ought to worship the Creator of all things. Animals have not this faculty.

Is it *natural* for any animal but man to walk on two legs?

It is not. Monkeys and Apes never do it from choice, though they are sometimes trained to do it.

Has any race of animals *improved* like the human race?

No, animals have not improved at all, the first bee-hive was as perfect as the one made yesterday, and animals have no more power *now* than they had one thousand years ago.

LESSON TWENTY-FOURTH.

The Length of Life.

Do most people live to be old ?

No, one half die before they are eight years old. Only one out of three lives to fourteen, and but one in four lives to see twenty-one.

What is that general rule which tells how long a thing will live ?

Whatever grows quick decays quick, or as it is worded in the old saying, "*Soon ripe, soon rotten.*"

Can you give me any instances of this ?

Yes, man is twenty-five years in growing and sometimes lives to eighty and ninety. But a dog that gets its growth in two years lives but ten or twelve.

Are fishes a long time in getting their growth ?

They are, and generally live two or three hundred years.

How long is the elephant in getting his growth ?

Thirty years.

How long does he live ?

Two hundred years.

What length of time does the rhinosceros continue to grow ?

Fifteen years.

How long does it live ?

From eighty to ninety years.

When does the camel get its growth ?

At the end of four years, and lives from forty to fifty.

How long is the horse in growing ?

Four years, and lives from twenty to thirty.

When does the sheep finish its growth ?

At the end of the first year, and lives but eight or ten years.

When does the hog stop growing ?

At the end of ten months and lives about as many years.

Does the same rule apply to birds ?

Yes, they get their growth in two or three months, and live only two or three years.

Do large animals generally live longer than small ones ?

They do.

Are there any exceptions to the above rule ?

Yes, many, for the raven and the eagle obtain their growth in a short time, but live from fifty to a hundred years.

How long have fishes been known to live ?

Three hundred years.

Does a toad live long ?

Yes, one was known to live thirty-six years.

Do insects generally live a long time ?

No, they are usually short lived.

W. G.

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